

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>10574.204-WO</b>	<b>FOR FURTHER ACTION</b> see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. <b>PCT/DK2005/000515</b>	International filing date (day/month/year) <b>02/08/2005</b>	(Earliest) Priority Date (day/month/year) <b>02/08/2004</b>
Applicant <b>NOVOZYMES A/S</b>		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of **8** sheets.

It is also accompanied by a copy of each prior art document cited in this report.

## 1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

the international application in the language in which it was filed  
 a translation of the international application into \_\_\_\_\_, which is the language of translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b.  With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2.  Certain claims were found unsearchable (See Box No. II)

3.  Unity of invention is lacking (see Box No III)

## 4. With regard to the title,

the text is approved as submitted by the applicant  
 the text has been established by this Authority to read as follows:

## 5. With regard to the abstract,

the text is approved as submitted by the applicant  
 the text has been established, according to Rule 36.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

## 6. With regard to the drawings,

a. the figure of the drawings to be published with the abstract is Figure No. \_\_\_\_\_

as suggested by the applicant  
 as selected by this Authority, because the applicant failed to suggest a figure  
 as selected by this Authority, because this figure better characterizes the invention

b.  none of the figures is to be published with the abstract

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## Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of item 1.b of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, the international search was carried out on the basis of:
  - a. type of material:  
 a sequence listing  
 table(s) related to the sequence listing
  - b. format of material:  
 on paper  
 in electronic form
  - c. time of filing/furnishing:  
 contained in the international application as filed  
 filed together with the international application in electronic form  
 furnished subsequently to this Authority for the purpose of search
2.  In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
3. Additional comments:

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### Box II Observations where certain claims were found unsearchable (Continuation of Item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.: because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3.  Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box III Observations where unity of invention is lacking (Continuation of Item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet.

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-9

Method of constructing (producing) a variant polypeptide, for example an enzyme belonging to glycosyl hydrolase family 13.

2. claims: 10-13

Hybrid polypeptides having eg at least 80% sequence identity to SEQ ID NOs: 18-25 or being hybrid-hydrolases with introduced smaller residues.

In view of the fact that within the second invention a polypeptide, having at least 80% sequence identity to SEQ ID NO:18 is known (see Citation 7, Database Accession NO. AAB74216), the subject-matter of claims 10-13 has been further splitted into different inventions represented by the individual sequences, as the sequences lack a common special technical feature. Presently, only the subject-matter concerning the polypeptide with SEQ ID NO:18 has been searched.

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A. CLASSIFICATION OF SUBJECT MATTER  
 C12N9/10 C12N9/28 G0667/48 A21D8/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
 C12N 606G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, BIOSIS, Sequence Search, COMPENDEX, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	BEIER L ET AL: "Conversion of the maltogenic alpha-amylase Novamyl into a CGTase" PROTEIN ENGINEERING, OXFORD UNIVERSITY PRESS, SURREY, GB, vol. 13, no. 7, July 2000 (2000-07), pages 509-513, XP002296961 ISSN: 0269-2139 abstract	1-9
Y	WO 99/43793 A (NOVO NORDISK A/S; CHERRY, JOEL, ROBERT; SVENDSEN, ALLAN; ANDERSEN, CAR) 2 September 1999 (1999-09-02) abstract; claims 1-25	1-9 -/-

 Further documents are listed in the continuation of Box C. See patent family annex.

## \* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the International filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*C\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the International filing date but later than the priority date claimed

- \*T\* later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

- \*Z\* document member of the same patent family

Date of the actual completion of the International search

28 February 2006

Date of mailing of the International search report

31 MAR 2006

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## INTERNATIONAL SEARCH REPORT

International application No

PCT/DK2005/000515

## C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WIND R D ET AL: "ENGINEERING OF FACTORS DETERMINING ALPHA-AMYLASE AND CYCLODEXTRIN GLYCOSYLTRANSFERASE SPECIFICITY IN THE CYCLODEXTRIN GLYCOSYLTRANSFERASE FROM THERMOANAEROBACTERIUM THERMOSULFURIGENES EM1" EUROPEAN JOURNAL OF BIOCHEMISTRY, BERLIN, DE, vol. 253, 1998, pages 598-605, XP000941734 ISSN: 0014-2956 abstract	1-9
Y	MORRISON K L ET AL: "Combinatorial alanine-scanning" CURRENT OPINION IN CHEMICAL BIOLOGY, CURRENT BIOLOGY LTD, LONDON, GB, vol. 5, no. 3, June 2001 (2001-06), pages 302-307, XP002325957 ISSN: 1367-5931 table 1	1-9
Y	US 2003/199072 A1 (CRENNELL SUSAN J ET AL) 23 October 2003 (2003-10-23) Sections [0013], [0017], [0089]	1-9
A	WO 03/073238 A (CALIFORNIA INSTITUTE OF TECHNOLOGY; DATTA, DEEPSHIKHA; WANG, PIN; CARR) 4 September 2003 (2003-09-04) First paragraph on page 90	1-9
X	DATABASE Geneseq [Online] 23 May 2001 (2001-05-23), "Bacillus maltogenic amylase protein." XP002357012 retrieved from EBI accession no. GSP:AAB74216 Database accession no. AAB74216 the whole document & WO 01/16349 A (NOVOZYMES A/S) 8 March 2001 (2001-03-08)	10,11,13
X	DAUTER ZBIGNIEW ET AL: "X-ray structure of Novamyl, the five-domain "maltogenic" alpha-amylase from <i>Bacillus stearothermophilus</i> : Maltose and acarbose complexes at 1.7 ANG resolution" BIOCHEMISTRY, vol. 38, no. 26, 29 June 1999 (1999-06-29), pages 8385-8392, XP002369862 ISSN: 0006-2960 Abstract; Introduction; Results & Discussion	10,11,13
		-/-

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## C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	<p>DATABASE EPO Proteins. [Online]  25 January 2005 (2005-01-25), "Sequence 17  from Patent WO2005003337."  XP002369954  retrieved from EBI accession no.  EPOP:CQ980764  Database accession no. CQ980764  the whole document</p> <p>&amp; WO 2005/003337 A (NOVOZYMES A/S;  SVENDSEN, ALLAN; BEIER, LARS; SPENDLER,  TINA; JENSEN, M)  13 January 2005 (2005-01-13)  sequence 17</p> <p>-----</p>	10,11,13
E		10,11,13
A	<p>VAJDA S ET AL: "Necessary conditions for  avoiding incorrect polypeptide folds in  conformational search by energy  minimization"  BIOPOLYM; BIOPOLYMERS JAN 1993,  vol. 33, no. 1, January 1993 (1993-01),  pages 173-192, XP002356999  the whole document</p> <p>-----</p>	1-9

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date		Patent family member(s)		Publication date
WO 9943793	A	02-09-1999	AU 761751 82 AU 2512899 A CA 2320813 A1 EP 1066374 A1		12-06-2003 15-09-1999 02-09-1999 10-01-2001
US 2003199072	A1	23-10-2003	NONE		
WO 03073238	A	04-09-2003	AU 2003248370 A1 EP 1490677 A2		09-09-2003 29-12-2004
WO 0116349	A	08-03-2001	AU 6686100 A EP 1214442 A1		26-03-2001 19-06-2002
WO 2005003337	A	13-01-2005	AU 2004253985 A1		13-01-2005